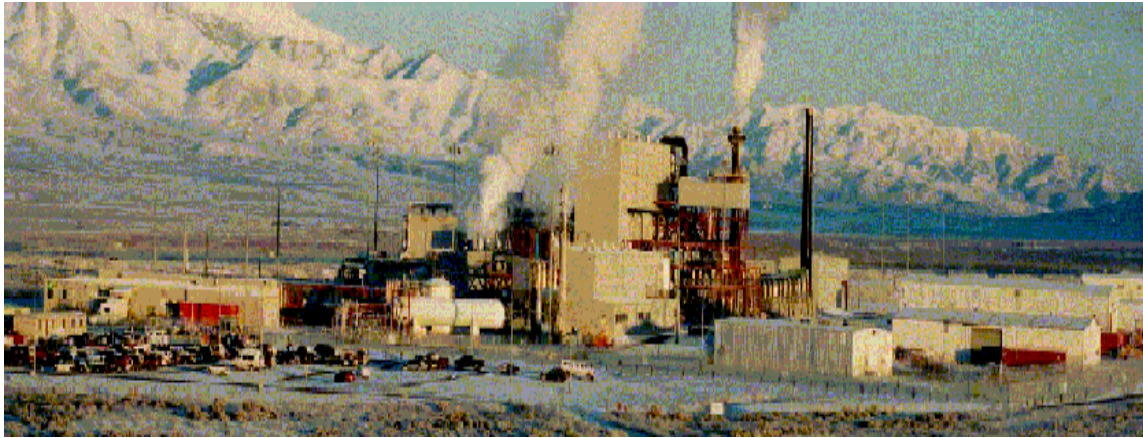


Tooele Chemical Agent Disposal Facility (TOCDF)



Request for a CLASS 3 MODIFICATION to the TOCDF RCRA Permit

Request Number: TOCDF-DFSQBpH-03-1014
Request Title: Revise DFS Quench Brine pH OPL
EPA ID Number: UT 5210090002

For the:

**STATE OF UTAH DEPARTMENT OF ENVIRONMENTAL QUALITY
(DEQ)**

Division of Solid and Hazardous Waste (DSHW)

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1. DESCRIPTION OF CHANGE

OVERVIEW

The TOCDF Deactivation Furnace System (DFS) is used to treat (i.e., deactivate by incineration) munition Propellant Explosive and Pyrotechnic (PEP) components in the form of bursters and fuzes. These components are removed from chemical munitions undergoing the demilitarization process. The DFS was initially used to treat M55 Rockets, which had the largest mass of PEP components of any munition processed by TOCDF [i.e., about 21 pounds (lb) of PEP per rocket].

As the different agent and munition campaigns have progressed, the munition PEP mass fed to the DFS has become smaller. During the VX Campaign, the 155-mm Projectile bursters fed to the DFS each weighed 2.45 lb. During the current Mustard Campaign, the 155-mm Projectile bursters fed to the DFS each weigh 0.41 lb.

The last munitions that will be processed in the DFS are 4.2-inch HT and HD Mortars. The 4.2-inch Mortars contain a total of 0.14 lb of PEP per munition; this weight is the sum of the PEP content contained in both the burster and fuze.

The Clean Air Act (CAA) Hazardous Waste Combustor Maximum Achievable Control Technology (HWC MACT) regulations require owners and operators of hazardous waste incinerators to perform a Comprehensive Performance Test (CPT) every five years. The most recent DFS performance test that conformed to the CPT requirements was the July 2003 DFS VX Agent Trial Burn (ATB). The current DFS Operating Parameter Limits (OPLs) were established during this ATB, and these are the OPLs currently documented in the TOCDF Resource Conservation and Recovery Act (RCRA) Permit, Conditions V.D.1 and V.D.2.

The TOCDF is intending to conduct a DFS CPT during the first quarter of 2009 to comply with the five year HWC MACT performance testing requirement. Test data generated during this CPT will be used to support a revision of the OPL associated with Quench Brine pH. Therefore, this permit modification proposes to revise the Quench Brine pH OPL specified in Permit Condition V.D.2.t to the value that will be established by the upcoming DFS HWC MACT CPT.

In association with this permit modification, the TOCDF intends to submit a Temporary Authorization Request to allow for a lower Quench Brine pH OPL to be effective beginning with the CPT shakedown period and extending to when the CPT Report is submitted to State regulators. At that point, the CPT-demonstrated value will be incorporated into Module V of the TOCDF RCRA Permit.

This permit change is classified as a Class 3 Permit Modification based on the Code of Federal Regulations 40 CFR 270.42, Appendix I, L.5.a, which reads:

Modification of the limits specified in the permit for *minimum or maximum combustion gas temperature, minimum combustion gas residence time, oxygen concentration in the secondary combustion chamber, flue gas carbon monoxide and hydrocarbon concentration, maximum temperature at the inlet to the particulate matter emission control system, **or operating parameters for the air pollution control system**.* *The Director will require a new trial burn to substantiate compliance with the regulatory performance standards unless this demonstration can be made through other means.*

2. JUSTIFICATION FOR CHANGE

The pH of Pollution Abatement System (PAS) scrubber solutions is one of the operating parameters used to indirectly measure compliance with the hydrogen chloride (HCl) emission standard. It is an OPL established during performance testing (e.g., CPTs and Agent Trial Burns). Other OPLs that are established during performance testing and associated with the HCl emission standard are Chlorine Feed Rate, Venturi Scrubber Differential Pressure, Exhaust Gas Flow Rate, and Scrubber Solution Flow Rates. These OPLs are referred to as surrogate measures of compliance because they are indirect measurements of compliance relative to the direct measurement, which is the results from the exhaust gas samples obtained during the three runs that comprise the performance test.

This permit modification request only proposes to revise the Venturi Scrubber pH OPL, which is established as a minimum limit, on a one-hour rolling average basis. This change is requested to allow TOCDF to establish a new OPL for this parameter during an upcoming performance test, which is required by the HWC MACT regulations. Results from this testing are proposed to be used to re-establish this OPL, which is an OPL regulated by both the HWC MACT regulations and the TOCDF RCRA Permit. TOCDF Permit Condition V.D.2.t. specifies the OPL for Quench Brine pH and reads:

V.D.2.t. The pH of the quench brine shall be maintained above 8.7* over a one-hour rolling average.

TOCDF is proposing to revise this Permit Condition by adding a sub-condition (in bold) which would read;

V.D.2.t. The pH of the quench brine shall be maintained above 8.7* over a one-hour rolling average.

V.D.2.t.i. *The Permittee may revise the limit specified in condition V.D.2.t. upon submission of performance test results that support the revised limit provided the performance test results also demonstrate that no change is required for the chlorine feed rate limit specified in condition V.D.1.d, and the Operating Parameter Limits specified in conditions V.D.2.l and V.D.2.p through V.D.2.s.*

Note, the V.D.2 conditions referenced in the proposed condition specify OPLs associated with HCl emission standard surrogate measures of compliance.

The OPLs specified in condition V.D.2, to include the minimum Quench Brine pH OPL, were established from results of the DFS VX Agent Trial Burn (ATB). The waste feed during this ATB was VX M55 Rockets, which contained only minimal amounts of chlorine in the rocket shipping and firing tubes. The chlorine feed rate during this ATB was so small that the chlorine

feed rate specified in Permit Condition V.D.1.d was established based on a Maximum Theoretical Emission Calculation (MTEC), which assumed the DFS PAS did not have any chlorine abatement capabilities and that HCl (the combustion product of chlorine) is being emitted at the emission standard of 32 parts per million corrected to 7 percent oxygen.

The OPLs are required to be established based on the data collected during performance testing. The DFS VX ATB established minimum Quench Brine pH OPL was established at the relatively high value of 8.7 pH not because of a need to abate high exhaust gas concentrations of HCl. Rather it was established at an 8.7 pH because of a leaking process valve which allowed make-up sodium hydroxide to leak into the Quench Brine, which raised the pH of the Quench Brine during the ATB.

Acid gas scrubber systems that are operated with solutions having a pH higher than necessary to control acid gas emissions also scrub, or remove, greater amounts of the carbon dioxide (CO₂) present in the exhaust gas. This scrubbed CO₂, now in the form of sodium carbonate (Na₂CO₃) accelerates the rate of increase in scrubber brine density. Scrubber brine is discharged to the Brine Reduction Area (BRA) storage tanks based on a maximum density OPL. The excess scrubbing of CO₂ (caused by higher-than-necessary Quench Brine pH) wastes sodium hydroxide (an energy-intensive chemical to produce) and increases the generation rate of Spent Scrubber Brine (a hazardous waste).

The TOCDF is proposing to revise the quench brine pH based on performance test results. The exhaust gas sampling suite associated with a HWC MACT CPT includes exhaust gas sampling for particulate, HCl, metals, and dioxins. HCl emissions will be quantified during this proposed CPT. This permit modification request assumes the test data and results associated with HCl exhaust gas sample and the DFS operational data collected during the test will support the desired change.

If approved, the proposed permit condition would allow implementation of the change to the DFS Quench Brine pH OPL upon submission of the performance test data to the Executive Secretary. The justification for allowing a change to this OPL upon submission of the data is:

- The 4.2" mortar fuze and burster explosive formulations contain such a minimal amount of chlorine that the HCl generated from its combustion would be un-measurable.
- The initial performance test conducted on the DFS, the Surrogate Trial Burn (STB), demonstrated the capabilities of this incinerator to control emissions of HCl at concentrations below the Emission Standard of 32 parts per million, corrected to 7 percent oxygen when feeding chlorine at average rates of 529 lb/hour (hr). During the 4.2-inch HT and HD Mortar Campaigns, the DFS will process fuzes and bursters whose energetic formulations contain essentially no chlorine. Note that one compound does contain a chlorine-containing compound. This compound is 29 percent by weight chlorine. However this compound also only comprises 32 percent by weight of the energetic compound, which is present in the mortar fuze at 50 milligrams (mg). The overall amount of chlorine fed with each mortar fuze is 50 mg energetic/fuze * 1 gm/1000

$\text{mg} * 1 \text{ lb}/453.6 \text{ gm} * .32 \text{ lb KClO}_3/\text{lb energetic} * .29 \text{ lb Cl}/\text{lb KClO}_3 = 1 * 10^{-5} \text{ lb Cl}/\text{mortar fuze}.$

- The performance test data will be submitted to the Executive Secretary concurrent with the DFS Notification of Compliance (NOC) submission to the State of Utah Division of Air Quality. The HWC MACT regulations require the incinerator to be operated using the OPLs specified in the NOC upon submission of the NOC.

Table 1 below shows a comparison of the chlorine feed rates and emissions experienced during the DFS STB compared to those anticipated during 4.2-inch Mortar energetic processing.

Table 1. DFS HCl Surrogate Trial Burn vs. DFS HCl 4.2" Mortar Processing

DFS Surrogate Trial Burn (STB) Data			DFS 4.2" Mortar Processing	
DFS STB Chlorine Feed Rates¹ Chlorobenzene (C ₆ H ₅ Cl) Feed Rate Run 3 (lbs/hr) 593 Run 4 (lbs/hr) 575 Run 5 (lbs/hr) 588 Three Run Ave (lbs/hr) 585 Chlorobenzene Cl wt.% 31.5% Ave. Cl _{MCB} Feed Rate (lbs/hr) 184 Hexachloroethane (C ₂ Cl ₆) Feed Rate Run 3 (lbs/hr) 401 Run 4 (lbs/hr) 386 Run 5 (lbs/hr) 397 Three Run Ave (lbs/hr) 395 Hexachlorethane Cl wt.% 89.9% Ave. Cl _{HCE} Feed Rate (lbs/hr) 355 DFS STB Ave Cl Feed Rate (lbs/hr) 539			DFS 4.2" Mortar Chlorine Feed Rates	
			0.003	DFS 4.2" Mortar Cl Feed Rate <u>Actual</u> (lbs/hr)
			6.8	Maximum Permitted 4.2" Mortar Cl Feed Rate (lbs/12-hr) ²
DFS STB Maximum HCl Emissions³			DFS 4.2" Mortar Processing HCl Emissions	
Run 4 HCl Catch (mg)		4.1		
Run 4 HCl Sample Volume (dscf)		88.451		
Run 4 Exhaust Gas O ₂ Conc (O ₂ %)		9		
Run 4 HCl Emissions (ppmdv @ 7% O ₂)		1.26		
TOCDF RCRA Permit Performance Standard (ppmdv @ 7% O ₂)		32		
DFS STB HCl Emission Standard Operating Parameters			Expected DFS 4.2" HT Mortar Operating Parameters	
Cl Feed Rate (lbs/hr)		539	0.003	Cl Feed Rate (lbs/hr)
Ave. Exhaust Gas Flow Rate (scfm) ⁵		19,094	12,210	Exhaust Gas Flow Rate (scfm) ²
Ave. Venturi Scrubber dP (in. w.c.) ⁶		31.3	30	Venturi Scrubber dP (in. w.c.) ²
Ave. Scrubber Brine Flow Rate (gpm) ⁶		354	310	Scrubber Brine Flow Rate (gpm) ²
Ave. Quench Brine pH (pH) ⁶		8.5	7	Quench Brine pH (pH) ⁷
L/G Ratio		0.02	0.03	L/G Ratio

¹Source is Table ES-1 of TOCDF Surrogate Trial Burn Report for the DFS; Rev 0, Nov. 20, 1995.

²Source is TOCDF RCRA Permit, Module V, Section V.D.

³HCl concentration derived from information found in Table D-7d-8 of TOCDF Surrogate Trial Burn Report for the DFS; Rev 0, Nov. 20, 1995.

⁴Chlorine feed rate derived from information contained in Table 2-C-2, Attachment 2 of the TOCDF RCRA Permit.

⁵Exhaust gas flow rate derived from information found in Table D-7d-8 of TOCDF Surrogate Trial Burn Report for the DFS; Rev 0, Nov. 20, 1995.

⁶Values derived from Table D-7g-1 of TOCDF Surrogate Trial Burn Report for the DFS; Rev 0, Nov. 20, 1995.

⁷Anticipated Quench Brine pH OPL for DFS 4.2" Mortar processing.

IMPACT TO THE TOCDF

If approved, this permit modification will have positive impacts on TOCDF DFS operations.

Environmental Impacts

This change will have a positive impact on the environment since it will reduce the DFS Spent Scrubber Brine generation rate. The TOCDF anticipates that the results of the planned DFS CPT will justify lowering the Quench Brine pH OPL, which will be more appropriate to the low-chlorine-content waste stream being processed. Controlling the Quench Brine pH to a lower value will result in less CO₂ being removed from the exhaust gas, which will slow the rate of Quench Brine density increase, which in turn will reduce the generation of Spent Scrubber Brine.

Additionally, TOCDF will consume less sodium hydroxide (the chemical added to the Quench Brine to remove acid gases from the exhaust gas). The production of sodium hydroxide is an energy intensive process; therefore, it is wasteful to use more than necessary.

TOCDF Personnel Impacts

There will be no impact on TOCDF personnel should this permit modification request be approved.

Physical TOCDF Impacts

There are no physical impacts on the facility. If this modification request is approved, changes to the DFS Programmable Logic Controller (PLC) code and function tests will be required (the function tests ensure that the code changes cause the DFS to operate as expected).

3. PERMIT CHANGE PAGES

Change Pages in Permit Body

Module V, Page 24

Change Pages in Permit Attachments

Attachment 19, Page 20 – To be revised based on results obtained from DFS HWC
MACT CPT.

Changes to Permit Drawings

None

4. SUPPORTING INFORMATION

4.1 Table 1 Data References

Section 4.1

Table 1 Data References